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THE SECOND INTRODUCTION OF THE AMAZON FLY
FROM BRITISH GUIANA INTO PUERTO RICO

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THE AMAZON FLY IS AN IMPORTANT BRAZILIAN PARASITE OF THE SUGARCANE BORER.

THE AMAZON FLY, METAGONISTYLUM MINENSE TOWNS., IS AN IMPORTANT PARASITE OF THE SUGARCANE BORER, DIATRAEA SACCHARALIS F., THAT HAS BECOME ESTABLISHED IN BRITISH GUIANA. IT WAS DISCOVERED IN BRAZIL BY J. G. MYERS IN 1933, PARASITIZING THE LARVAL STAGE OF THE BORER IN WATER GRASSES IN THE UPPER AMAZON VALLEY.¹ THE FIRST ATTEMPT TO INTRODUCE THIS PARASITE INTO PUERTO RICO WAS MADE BY S. M. DOHANIAN IN 1935, WORKING UNDER THE DIRECTION OF C. P. CLAUSEN, CHIEF OF THE DIVISION OF PARASITE INTRODUCTION OF THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE.² SINCE THIS INTRODUCTION FAILED OF ESTABLISHMENT, A SECOND ATTEMPT WAS MADE BY THE PUERTO RICO EXPERIMENT STATION DURING SEPTEMBER AND OCTOBER 1937 IN COOPERATION WITH THE SAME BUREAU.

A TRIP WAS MADE TO BRITISH GUIANA TO OBTAIN THE AMAZON FLY.

ARRANGEMENTS WERE COMPLETED IN AUGUST 1937 WHEREBY THE STATION AGREED TO SEND AN ENTOMOLOGIST TO BRITISH GUIANA TO OBTAIN AS LARGE A BREEDING STOCK AS POSSIBLE OF THE AMAZON FLY FROM WHICH LARGE NUMBERS OF THE FLY COULD BE REARED

¹ MYERS, J.G. SECOND REPORT ON AN INVESTIGATION INTO THE BIOLOGICAL CONTROL OF WEST INDIAN INSECT PESTS. IMPERIAL INSTITUTE OF ENTOMOLOGY, LONDON, REPORTED IN BULL. ENT. RES. JUNE 1935, VOL. 26.

² DOHANIAN, S. M. THE INTRODUCTION OF PARASITES OF THE SUGARCANE BORER INTO PUERTO RICO. THE JOURNAL OF AGRICULTURE OF THE UNIVERSITY OF PUERTO RICO, VOL. XXI, NO. 2, APRIL 1937, PP. 237-241.

WHEN OTHER COMPANIES BECOME INTERESTED

AND LIBERATED AT VARIOUS POINTS OVER THE ISLAND. THE PROJECT WAS FINANCED BY THE PUERTO RICO SUGAR PRODUCERS ASSOCIATION AND THE FAJARDO SUGAR COMPANY WHO TOGETHER PROVIDED A FUND OF \$550.00 TO DEFRAY THE EXPENSES OF THE TRIP.^{/1}

I WAS ASSIGNED TO THIS WORK AND SPENT A PERIOD OF APPROXIMATELY 4 WEEKS IN BRITISH GUIANA DURING SEPTEMBER 1937 CONDUCTING THIS INVESTIGATION. I WISH TO TAKE THIS OPPORTUNITY TO EXPRESS AGAIN MY THANKS TO J. SIDNEY DASH, DIRECTOR OF THE DEPARTMENT OF AGRICULTURE OF BRITISH GUIANA, WHO GRACIOUSLY PERMITTED ME TO USE THE LABORATORY QUARTERS AND EQUIPMENT OF THAT DEPARTMENT. THE GOVERNMENT ENTOMOLOGIST, L.D. CLEARE, WAS MOST COOPERATIVE; MR. CLEARE GAVE MOST FREELY OF HIS TIME, AND HE AND HIS LABORATORY ASSISTANT AIDED GREATLY IN FACILITATING MY WORK. I WISH ALSO TO EXPRESS MY THANKS TO THE MANAGERS OF PLANTATIONS DIAMOND AND BLAIRMONT WHO PERMITTED ME TO COLLECT DIATRAEA LARVAE ON THEIR PROPERTIES.

THE AMAZON FLY HAS BECOME SUCCESSFULLY ESTABLISHED IN BRITISH GUIANA.

THE CONDITIONS UNDER WHICH THE AMAZON FLY WAS DISCOVERED INDICATE THAT THE SPECIES IS APPARENTLY FAVORED BY MOIST ENVIRONMENT. ALMOST IDENTICAL CONDITIONS ARE PROVIDED IN BRITISH GUIANA CANE FIELDS, SINCE THE GREATER PART OF THE CANE LAND IS BELOW SEA LEVEL AND EACH CANE FIELD IS COMPLETELY SURROUNDED BY WATER. IN BRITISH GUIANA THERE IS ALSO GROWN CONSIDERABLE RICE WHICH IS INFESTED BY D. SACCHARALIS. WHILE THE PERCENTAGE OF PARASITIZATION BY THIS PARASITE IN RICE HAS BEEN FOUND TO BE LOW, IT MAY SERVE AS A RESERVOIR FOR THE PARASITE WHEN OTHER CONDITIONS BECOME UNFAVORABLE.

THE INTRODUCTION OF THE AMAZON FLY IN 1933 INTO BRITISH GUIANA HAS RESULTED IN A NOTABLE DECREASE IN THE POPULATION OF DIATRAEA SACCHARALIS. THE FORMER PRACTICE OF CUTTING OUT "DEAD HEARTS" OF SUGARCANE HAS BEEN DISCONTINUED AT A TREMENDOUS SAVING TO THE GROWERS. CLEARE^{/2} REPORTED IN 1937 THAT THE PARASITIZATION AVERAGED 13.7 PERCENT FOR ALL FIELDS AND RANGED IN "POSITIVE FIELDS"^{/3} FROM 3.4 TO 36.2, 18.4 PERCENT OF THESE FIELDS HAVING A PARASITIZATION OF OVER 30 PERCENT. MY COLLECTIONS OF DIATRAEA LARVAE SHOWED NO LESS THAN 25 PERCENT PARASITIZATION, BUT A DEFINITE FIGURE WAS NOT READILY OBTAINED.

DIATRAEA LARVAE WERE COLLECTED AND INOCULATED IN BRITISH GUIANA TO REAR THE AMAZON FLY.

COLLECTIONS OF DIATRAEA LARVAE WERE STARTED ON SEPTEMBER 8 AND TERMINATED ON SEPTEMBER 29. THE LARVAE FROM OUTLYING PLANTATIONS WERE SHIPPED TO THE

^{/1} OF THIS AMOUNT \$100.00 WAS ALLOTTED BY THE FAJARDO SUGAR COMPANY.

^{/2} CLEARE, L. D. STATUS OF THE AMAZON FLY IN BRITISH GUIANA, 1937. THE AGRICULTURAL JOURNAL OF BRITISH GUIANA, VOL. IX, MARCH 1938, PP. 12-24.

^{/3} "POSITIVE FIELDS" ARE THOSE FIELDS IN WHICH PARASITES WERE FOUND.

LABORATORY EACH DAY BY EXPRESS. THE TOTAL NUMBER OF LARVAE COLLECTED, THOUGH NOT ACTUALLY COUNTED, WAS ABOUT 1,500, OF WHICH 1,219 LARVAE WERE USED FOR INOCULATION PURPOSES.

IN ADDITION TO METAGONISTYLUM MINENSE, THE AMAZON FLY, THE ONLY PARASITES REARED FROM THESE LARVAE WERE 4 SPECIMENS OF IPOBRACON SP. WHILE STOMATODEXIA DIADEMA WIED. IS RECORDED AS BEING PRESENT IN BRITISH GUIANA, NO ADULTS OF THIS SPECIES WERE REARED.

THE METHODS PREVIOUSLY USED IN BRITISH GUIANA WERE EMPLOYED IN BREEDING THE AMAZON FLY.

THE METHODS FOLLOWED IN REARING THE AMAZON FLY FOR SENDING TO PUERTO RICO WERE EXACTLY THE SAME AS THOSE USED IN BRITISH GUIANA DURING THE PAST BREEDING CAMPAIGN. EACH LARGE DIATRAEA LARVA WAS INOCULATED WITH TWO PARASITE LARVAE, THE SMALL DIATRAEA RECEIVING ONLY ONE PARASITE LARVA. THE PARASITE LARVAE WERE DISSECTED FROM THE UTERUS OF MATED FEMALES WHICH HAD COMPLETED A 7-DAY GESTATION PERIOD. THE INOCULATED DIATRAEA LARVA WAS THEN PLACED IN A PREPARED CANE SHOOT. YOUNG SHOOTS OF SUGARCANE WERE CUT TO 8-INCH LENGTHS; EACH LENGTH WAS THEN SPLIT AND A 1-INCH SECTION OF THE INSIDE WAS REMOVED TO FORM A SMALL CAVITY. AFTER THE DIATRAEA LARVA HAD BEEN PLACED IN A SALINE SOLUTION, 1 GRAM TO 1 LITER OF WATER, IT WAS INOCULATED WITH THE PARASITE LARVAE BY MEANS OF A CAMEL'S-HAIR BRUSH, AND THEN PLACED IN THE CAVITY. THE STALKS OF CANE WERE HELD TOGETHER IN GROUPS OF 10 BY MEANS OF A RUBBER BAND. THESE WERE THEN PLACED IN A GALVANIZED IRON CYLINDER ABOUT 15 INCHES IN DIAMETER COMPLETELY CLOSED EXCEPT FOR A 2-INCH CIRCULAR HOLE IN THE SIDE, WHICH WAS COVERED WITH FINE-MESH WIRE FOR VENTILATION. ON THE BOTTOM OF THE CONTAINER WAS PLACED A LAYER OF SHREDDED BAGASSE. AT THE END OF 12 DAYS THE MATERIAL WAS GONE OVER AND THE PARASITE PUPARIA WERE REMOVED AND PLACED ON MOIST BAGASSE IN ANOTHER CONTAINER FOR EMERGENCE.

A TOTAL OF 1,219 DIATRAEA LARVAE WAS INOCULATED.

A TOTAL OF 1,219 DIATRAEA SACCHARALIS LARVAE WAS INOCULATED FROM SEPTEMBER 20 TO 29, INCLUSIVE. THE DIATRAEA LARVAE COLLECTED DURING THE EARLY PART OF THE MONTH WERE USED TO OBTAIN A BREEDING STOCK OF THE AMAZON FLY FOR THIS INOCULATION WORK. FROM THESE INOCULATIONS THERE WAS REARED A TOTAL OF 486 PUPARIA OF THE AMAZON FLY, M. MINENSE. ALTHOUGH THIS PARASITE EMERGENCE WAS LOW, IT PROVIDED A BREEDING STOCK FOR SHIPMENT TO PUERTO RICO.

PUPARIA AND ADULT FLIES OF THE AMAZON FLY WERE SHIPPED TO PUERTO RICO.

THE FIRST SHIPMENT OF AMAZON FLY ADULTS AND PUPARIA WAS SENT FROM BRITISH GUIANA BY AIR EXPRESS ON SEPTEMBER 25. THIS SHIPMENT CONTAINED 120 PUPARIA AND 53 ADULT FLIES; 43 OF THE ADULTS REACHED PUERTO RICO ALIVE. SEVEN OF THE FLIES WERE MATED FEMALES WHICH WERE RETAINED FOR BREEDING PURPOSES.

ON OCTOBER 3 I RETURNED TO PUERTO RICO FROM BRITISH GUIANA BY AIRPLANE AND BROUGHT UNDER PERSONAL CARE 284 PUPARIA AND 57 ADULTS OF THE AMAZON FLY. A SHIPMENT OF 202 ADDITIONAL PUPARIA WAS RECEIVED ON OCTOBER 10. THESE PUPARIA WERE ASSEMBLED AND SHIPPED BY L. D. CLEARE, ENTOMOLOGIST, AND WERE REARED FROM

DIATRAEA LARVAE INOCULATED DURING MY STAY IN BRITISH GUIANA.

AS A RESULT OF THIS PROJECT, A TOTAL OF 606 PUPARIA AND 110 ADULTS OF THE AMAZON FLY, M. MINENSE, WAS INTRODUCED INTO PUERTO RICO DURING SEPTEMBER AND OCTOBER 1937. THIS FLY IS NOW BEING REARED IN THE LABORATORY, AND EXTENSIVE LIBERATIONS ARE BEING MADE THROUGHOUT THE CANE-GROWING AREAS OF THE ISLAND. THE FLY HAS ALREADY BEEN RECOVERED IN A NUMBER OF COLLECTIONS OF SUGARCANE BORERS NEAR THE POINTS OF LIBERATION. BY CONTINUING LIBERATIONS IT IS HOPED THAT THIS BENEFICIAL INSECT WILL EVENTUALLY BECOME ESTABLISHED AND AID IN THE CONTROL OF OUR MOST SERIOUS SUGARCANE PEST.

OBSERVATIONS ON THE YELLOW SUGARCANE APHID WERE MADE IN BRITISH GUIANA.

THE YELLOW CANE APHID, SIPHA FLAVA FORBES, IS A SERIOUS PEST AT CERTAIN SEASONS IN BRITISH GUIANA. INFESTATIONS OF THIS INSECT, ACCORDING TO L. D. CLEARE, ENTOMOLOGIST, ARE CORRELATED WITH PROLONGED WET WEATHER AND POOR DRAINAGE. THE LATTER CONDITION WAS NOTICEABLE IN INFESTATIONS THAT WERE SEEN. THE APHID ATTACK LEFT THE CANE LEAVES COVERED WITH A BLACK FUNGUS WHICH HAD DEVELOPED ON THE HONEYDEW EXCREMENT OF THE APHIDS.

A NUMBER OF PREDATORY BEETLES ARE REPORTED AS ATTACKING SIPHA FLAVA IN BRITISH GUIANA, BUT ONLY TWO OF THESE ARE IMPORTANT, NAMELY, THE LADYBEETLES CYCLONEDA SANGUINEA L. AND SCYMNUS PHLOEUS MULS., BOTH OF WHICH ARE KNOWN TO OCCUR IN PUERTO RICO.

